Lights, camera ... action? Altered attitudes and behaviour in response to the climate change film The Age of Stupid

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Abstract
The film *The Age of Stupid* depicts the world in 2055 devastated by climate change, combining this with documentary footage which illustrates many facets of the problems of climate change and fossil-fuel dependency. This study investigates the effects of the film on UK viewers' attitudes and behaviour through a three-stage survey. Analysis of changes in attitudes focussed particularly on respondents' *concern* about climate change, *motivation* to act, *fear* about the potential for catastrophe, beliefs about *responsibility* for action, and sense of *agency*. The film increased concern about climate change, motivation to act, and viewers' sense of agency, although these effects had not persisted 10-14 weeks after seeing it. It was also successful in promoting some mitigation actions and behavioural change, although respondents reported barriers to further action, such as limited options for improving home energy efficiency among those in rented accommodation. However, filmgoers were atypical of the general public in that they exhibited very high levels of concern about climate change, knowledge about how to reduce their carbon emissions, and contact with organisations campaigning about climate change, before they saw the film. The paper considers how these factors may have enabled viewers to respond to the film as they did, as well as policy implications for those seeking to develop effective climate change communications.

Keywords
Pro-environmental behaviour
Behavioural change
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Public attitudes
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Motivation

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1. Introduction

Individuals are responsible, through their use of household energy and personal travel, for approximately 35% of total UK greenhouse gas (GHG) emissions, and indirectly, through household final consumption expenditure, for a further 51% (ONS, 2004). Clearly, significant reductions must be made in individuals' emissions in order to meet UK targets of 80% reductions from 1990 levels by 2050. Faced with the failure of traditional information campaigns about environmental issues to promote behavioural changes among the UK public (Hinchliffe, 1996; Collins, 2004), concerned individuals and organisations have been seeking alternative ways to raise concern about climate change and promote lower-carbon lifestyles. *The Age of Stupid* is a film made with the stated intention "to turn 250 million viewers into climate activists" (AoS, 2010). It presents a dystopian vision of the future, along with documentary strands which outline many of the facets of the problem of our dependency on fossil fuels. This paper assesses the success of the film in motivating viewers to raise awareness and lobby politicians about climate change, and to make behavioural changes to reduce their GHG emissions, and seeks to draw conclusions about the use of vivid and emotionally-engaging messages in climate change communications.

1.1 Climate change communications: information, affect and agency

Although knowledge about both the causes of climate change and means of reducing emissions is an important factor influencing pro-environmental intentions and behaviour (Bord et al., 2000; O'Connor et al., 2002; Gram-Hanssen, 2010), the 'information deficit' model of behaviour change, whereby it is assumed that the public simply need more information in order to take action, has been widely criticised as insufficient (e.g. Anable et al., 2006; Blake, 1999; Bulkeley, 2000; Owens, 2000). There is a well-documented gap between environmental attitudes (which are more amenable to change through information provision), and pro-environmental behaviour (Gatersleben et al., 2002; Kollmuss and Agyeman, 2002). In an attempt to effectively engage the public, visual and emotionally-based appeals are frequently employed within the environmental movement (Huddy and Gunnthorsdottir, 2000). Nicholson-Cole (2005, p.258) suggests that visual media offer many advantages for communicating motivating messages, including "the capacity to convey strong messages, making them easy to remember; condense complex information and communicate new content; provide the basis for personal thoughts and conversations, contributing to people's memory and issue-awareness; [and] communicate ideas in an instant". Research by Pooley and O'Connor (2000) suggests that affect – feelings about specific objects, ideas, and images – plays an important part in determining people's attitudes and responses to environmental issues, (see also Gatersleben and Appleton, 2007; Steg, 2005, who suggest that affective motives are important determinants of car use), and therefore that emotions, not just knowledge, need to be targeted by environmental education campaigns.

However, not all emotions are helpful in this context. Campaigns which appeal to fear as a motivator are problematic because fear can trigger denial, apathy, repression, anger and counterproductive defensive behaviours (such as buying a 'high-carbon' sports utility vehicle to protect oneself against an unpredictable environment) in response (Moser and Dilling, 2004). There is a need for a positive vision to sustain people taking climate change mitigation action because results will not be seen quickly (Moser, 2006).

Related to this is the fact that a sense of agency is one of the most important factors in determining whether people engage in pro-environmental behaviour (Gilg et al., 2005; Kaplan, 2000; Kollmuss and Agyeman, 2002). People need to believe that they *can* do something about the problem, and that it is *worth* doing something.

The Age of Stupid is one of several attempts to harness the advantages of visual communications to raise concern about climate change through film. Others include *The Day After Tomorrow* (2004), a scientifically inaccurate Hollywood disaster movie depicting sudden and catastrophic climate change, Al Gore's documentary *An Inconvenient Truth* (2006) and the documentary *Home* (2009).

A number of studies investigated the impact of *The Day After Tomorrow* on viewers, including one in the USA (Leiserowitz, 2004), two in the UK (Balmford et al., 2004; Lowe et al., 2006), one in Germany (Reusswig et al., 2004) and a Japanese study which is reported in Lowe (2006). The UK and US studies found increased levels of concern about climate change among viewers of the film (this was not investigated in the other studies), while the US, Japanese, and one UK study found that there was increased motivation to individual action among viewers, and the other studies found no change (see Lowe, 2006 for a summary of results of the five studies). Although some of the studies included a follow-up a few weeks after the initial research in order to determine whether observed effects had lasted, or to explore issues more deeply through focus groups, none of them investigated whether participants were actually taking any action that could be attributed to the effects of watching the film. There do not appear to be any studies which investigated the impact of other climate change films.

The Age of Stupid is interesting in that it combines elements found in these different types of films, weaving together fictional and documentary strands, and utilising dramatic and emotionally-charged images, factual human-interest stories, and cartoon animations in its attempt to engage viewers.

1.2 The Age of Stupid

The Age of Stupid is a 92-minute film featuring well-known actor Pete Postlethwaite as an old man living in 2055 in a world that has been devastated by climate change. The beginning of the film shows Sydney Opera House in flames, London underwater, and millions of refugees in a primitive camp. Postlethwaite's character is watching 'archive' footage from 2008 and asking, "Why didn't we save ourselves when we had the chance?"

This narrative theme provides the framework for six interweaving documentary strands which highlight different aspects of the climate change problem. One is about a windfarm developer in England whose latest proposal is being opposed by local people; a second documents the start-up of an Indian budget airline. There are also stories about those who are facing the impacts of climate change and fossil fuel dependency, including a young woman living in poverty in the Niger Delta (an area heavily polluted by Shell), an 82-year-old French mountain guide who has seen his beloved Alpine glaciers retreat by over 150 m in his lifetime, and a Shell employee who lost his home in Hurricane Katrina.

A third element of the film is a series of short, animated sequences explaining various points, such as the resources that go into producing bottled water.

The Age of Stupid went on general release in the UK on 20 March 2009 and received positive reviews in the mainstream press. On 23 March, the Age of Stupid website listed 78 cinemas showing the film during the opening week. These were mostly 'arthouse' venues, but included some mainstream cinemas, and the film ran for 5 weeks at the Odeon West End, London. The 'global premiere' of *The Age of Stupid* took

place on September 21/22, when it was beamed by satellite to 63 countries around the world (AoS, 2010).

The filmmakers have retained control of distribution so that individuals and organisations can hold their own screenings. This enables more widespread showing of the film than would otherwise be the case; as of 13 July 2010, 1452 screenings of the film have been arranged by independent organisers including non-governmental organisations, the National Health Service, and individuals screening to neighbours at home (AoS, 2010).

There are a number of reasons to explore whether *The Age of Stupid* is successful at promoting pro-environmental behaviour. Firstly, although the film makes an emotional appeal, it is essentially another information tool. Secondly, a dominant discourse utilised by the film is the disaster narrative, not only the fictional element but also, for example, through use of footage of the devastation wrought by Hurricane Katrina. Arguably, it appeals to fear as a motivator. Thirdly, although 'Not Stupid' action packs containing a brief list of suggestions under the heading 'What can I do?' were given out at many early screenings, the film itself does not directly give information about how viewers can respond to the issues raised. It does mention some possible policy options, such as carbon rationing, and it shows a few mitigation actions such as a couple calculating their carbon footprint and one character growing vegetables, but neither the film nor the action pack provide any information about how to go about lobbying politicians. (In part to address the lack of solutions-based messages, a separate campaign, 10:10, was launched on 1 September 2009 by Franny Armstrong, the director of the film, aiming to encourage individuals and organisations to reduce their carbon footprint by 10% in 2010[1].) These factors raise the question of whether the film promotes or decreases viewers' sense of agency to act. Thus it provides a case study to explore whether climate change communications utilising vivid images and stories, as advised in much of the literature (e.g. Futerra, 2005; Kearney, 1994; Trumbo and Shanahan, 2000), might be effective, or whether 'disaster narrative' framing of the information militates against this.

Additionally, *The Age of Stupid* garnered a lot of media attention ahead of its release, and seemed to have the potential to be influential. It has been mentioned in the UK Parliament, and Franny Armstrong spoke at several events alongside Ed Miliband, then Secretary of State for Energy and Climate Change (AoS, 2010). It was therefore considered interesting to study the impacts of the film on viewers, and to take the study further than those on *The Day After Tomorrow* by exploring effects on behaviour, as well as on levels of concern and motivation to act. The study was also designed to investigate whether the film affected viewers' levels of fear and sense of agency.

2. Methodology

To discover the effects of the film on viewers' attitudes, the study utilised a 'pre/post-test' approach, as in similar research (Lowe at al., 2006; O'Neill and Hulme, 2009; Reusswig et al., 2004). The pre-test was a questionnaire to elicit respondents' views before seeing the film, thus providing a baseline for comparisons with two 'post-test' questionnaires, one completed immediately after seeing the film, the other a follow-up at 10-14 weeks. This period was chosen as being long enough to determine whether the observed effects lasted for some weeks, and whether the film inspired viewers to start taking action, while being short enough that respondents would not forget minor actions they had taken soon after seeing the film.

[1] See the 10:10 campaign website, available at http://www.1010uk.org/

The first stage of data collection involved attending 21 screenings at the Edinburgh Filmhouse at different times of day from 20 to 24 March 2009, in order to sample a wide range of viewers. Cinemagoers were randomly approached in the foyer and asked to complete two questionnaires, one before seeing the film, the other immediately afterwards. They were offered a £5 Filmhouse voucher as an incentive, to be collected when the second questionnaire was handed in. In order to avoid encouraging 'socially desirable' responses, respondents were given a minimum of information about the study, and researchers were identified as from the University of Edinburgh but not as members of the Centre for the study of Environmental Change and Sustainability.

Participants were given a clipboard with the two questionnaires, which were attached in such a way that the second one was face down, with a reminder on the back that it should not be turned over and filled in until after the film. They were asked to hand in the first questionnaire before seeing the film, but to take the clipboard with the other one into the screening. Only three respondents out of a total sample of 244 who completed the first questionnaire failed to return the second one, and these three questionnaires were excluded from the analysis. Each questionnaire was uniquely numbered so that the 'before' and 'after' parts could be matched up. I tried to ensure that only one person from each household took part, so as not to skew results from the later follow-up questionnaire about actions taken, though individuals living in the same building but not part of one household (e.g. students in university accommodation) were allowed to participate.

The first questionnaire consisted of three multiple-choice questions plus socio-demographic information. The second questionnaire contained four multiple-choice questions, two of which were the same as those on the first one, plus two open questions. Research by Whitmarsh (2009a) has shown that the terms 'climate change' and 'global warming' are understood differently and evoke different levels of concern among the UK public. In order to avoid this affecting the data, the term 'climate change/global warming' was used throughout the survey when asking questions about climate change. In the film, 'global warming' and 'climate change' are used interchangeably. Questions regarding concern about climate change were put in the context of concern about other global issues such as AIDS and terrorism, allowing for comparison of the relative levels of concern about different issues. Respondents were asked to give their contact details if they were willing to take part in a follow-up survey.

Ten weeks after the end of the initial period of data collection, respondents who had given their contact details were sent an email with a link to a web-based follow-up questionnaire. This contained the same two questions about concern, beliefs and motivation as on the first two questionnaires, and multiple-choice questions about actions in four categories: raising awareness and lobbying politicians; home energy use; travel; and food. Respondents were given a unique number to input at the start of the questionnaire so their responses could be matched to the earlier questionnaires. Seventeen people who gave only a postal address were sent a paper version with a stamped addressed envelope to return it. As an incentive, respondents were offered the opportunity to have their name entered into a draw for a chance to win one of three £10 vouchers. Two reminders were sent. The deadline was 29 June 2009, approximately 14 weeks after the film was viewed.

The first two questionnaires (referred to below as 'Q1' and 'Q2'), were completed by 241 people, of whom 213 gave their contact details to be included in the follow-up. Of these, 162 completed the follow-up questionnaire ('Q3'), 67.2% of the initial sample.

3. Results: before and after questionnaires

3.1 Characteristics of survey respondents

Table 1 details the socio-demographic characteristics of the survey respondents. Respondents were most likely to be aged 25-34, with other age groups fairly evenly represented. The sample was skewed towards females, and respondents were more highly educated and more likely to be employed in managerial/professional occupations than the population of Edinburgh in the 2001 census. In the last year, 61.8% had donated money to "a local or national group that campaigns partly/wholly about climate change/global warming", and 36.1% stated that they were "actively involved (e.g. writing letters/attending events/taking personal action)" in such a group.

Table 1: Socio-demographic characteristics of respondents

	Group	Q1&2 (*n*=241) % of responses	Q3 (*n*=162) % of responses
Gender	Female	56.0	56.2
	Male	38.6	40.1
	Not given	5.4	3.7
Age	16-24	13.3	13.0
	25-34	23.2	24.7
	35-44	17.0	19.1
	45-54	14.9	13.0
	55-64	16.2	16.0
	65+	13.3	13.0
	Not given	2.1	1.2
Education	First degree/masters	68.5	68.5
	PhD	10.0	9.9
	Lower qualifications	15.3	14.8
	Not given	6.2	6.8
Occupation	Managerial/professional[a]	49.0	50.0
	Retired	17.4	17.3
	Student	13.3	14.2
	Intermediate occupations[a]	10.8	9.2
	Routine/manual occupations[a]	2.5	3.1
	Unemployed	1.2	1.2
	Homemaker	0.4	0
	Not given	5.4	4.9

[a] Occupations given were allocated to these classes as accurately as possible according to the National Statistics Socio-economic Classification (NS-SEC). Where it was not possible to determine the skill level of jobs which might be classed as either managerial/professional or intermediate, they were classed as managerial/professional, and thus this category might be inflated.

Interest in or concern about climate change was cited by 77.6% of respondents as a reason for coming to see the film, with 60.9% giving this as the main reason (*n* = 230; 11 people did not give a 'main reason'). Alternative primary reasons why people attended were "It was recommended by someone I knew" (17.0%), "I was invited to

come with someone else" (11.3%) and other reasons (10.8%), including having seen the website or the trailer; heard about the film on the radio or through a review, blog or social networking site; or liked other films featuring Pete Postlethwaite.

3.2 Concern about climate change

Respondents were asked about their level of concern about climate change and other global issues (AIDS, species extinctions, 'credit crunch'/recession, poverty, and terrorism) on all three questionnaires. Concern about climate change was very high even before seeing the film (see Table 2). There was a slight increase in the proportion of respondents who stated that they were "very concerned" immediately after seeing the film, but this did not prove significant using the Wilcoxon signed ranks test. Anticipating a 'ceiling effect', whereby respondents might feel heightened concern after the film but for this not to show up on a Likert scale if many had already chosen the highest point before the film, participants were asked to state directly on the second questionnaire whether their concern about climate change had increased. Of the 241 respondents, 17.4% replied "No", but 30.3% ticked "Yes, a bit" and 52.3% stated "Yes, a lot". These results need to be interpreted with caution, in that respondents may well have been sympathetic to the intentions of the film and so inclined to credit it with this effect, but the responses to the question about what message respondents were taking away from the film also suggest heightened concern (see section 3.5).

Table 2: Respondents' concern about climate change

Level of concern	Q1 (*n*=241) % of responses	Q2 (*n*=240) % of responses	Q3 (*n*=162) % of responses
Not at all concerned	0	0	0
Not very concerned	0.4	0	0.6
A little concerned	2.9	2.1	4.3
Somewhat concerned	14.9	14.6	13.6
Very concerned	81.7	83.3	81.5

On all three questionnaires, the proportion of respondents who were either "somewhat" or "very concerned" about climate change was higher than for any of the other issues they were asked about, with poverty coming second and terrorism lowest.

3.3 Changes in motivation, knowledge, fear and agency

Respondents were asked on all three questionnaires to indicate their agreement on a 7-point Likert scale (from "strongly disagree" to "strongly agree") with the statements shown in Table 3. Even before seeing the film, most participants felt motivated to do something about climate change, agreed that they knew what to do to reduce their carbon emissions, and felt a sense of agency, believing that they could do something and that it was worth taking action; they also feared that humanity will not do enough to prevent catastrophic climate change (see Table 3). Changes in responses between the first and second questionnaires were analysed using the Wilcoxon test and it was found that immediately after seeing the film respondents felt increased motivation to act ($z = 5.004$, $p < 0.001$)[2], and had an increased sense that they can do something about climate change ($z = 4.203$, $p < 0.001$). On the other hand, they were

[2] All p values are for two-tailed tests unless otherwise stated.

less likely to agree that they do as much as they can about climate change ($z = 5.655$, $p < 0.001$). There were no significant changes in agreement with the other statements. However, in a separate question, 15% of respondents agreed with the statement "I feel more confused about what I can do about climate change/global warming" and 11.3% agreed that "I feel less convinced that there is any point in trying to reduce my carbon emissions".

Table 3: Percentage of respondents who agreed with the statements listed (Q1: *n*=231-237; Q2: *n*=234-237; Q3: *n*=161-162)

Statement	Q1	Q2	Q3
I feel motivated to try to do something about climate change/global warming	90.2	95.8	91.4
I can do something to prevent climate change/global warming getting worse	85.7	93.6	87.8
I know what I can do to reduce my carbon emissions	92.3	92.3	92.5
Cutting my carbon emissions won't make a difference to the problem of climate change/global warming	21.3	20.5	19.2
It's worth lobbying politicians about climate change/global warming	89.0	90.7	82.8
I do as much as I can about climate change/global warming	64.5	52.8	57.7
I fear humanity will not do enough to prevent catastrophic climate change/global warming	84.7	88.1	85.1

3.4 Beliefs about catastrophe and responsibility

One of the most striking results was that, having seen the film, a large majority of respondents believed that there is a significant possibility of the kind of devastation shown in the film, by 2055 (Table 4). Only 7.5% of those who answered said they thought there was a less than one-in-three chance that this could occur.

Table 4: Responses to the multiple-choice question on Q2, 'How likely do you think it is that the world could be devastated by climate change/global warming and related problems, in the way it is in the film, by 2055?' (*n*=228)

Likelihood	% of responses
Virtually certain (over 99% chance)	8.3
Very likely (90-99% chance)	32.9
Likely (66-90% chance)	29.4
Medium likelihood (33-66% chance)	21.9
Unlikely (10-33% chance)	5.3
Very unlikely (1-10% chance)	1.8
Extremely unlikely (less than 1% chance) (one person)	0.4
Impossible	0

On the second questionnaire, participants were asked whose responsibility it is to reduce GHG emissions. This was an open question in order to see how people would reply unprompted. Most (87.1%; $n = 232$) believe that at least some responsibility belongs with individuals: the most commonly assigned code was "everyone" (49.6% of responses) with 12.5% saying "everyone, but government must take the lead," and

various other answers including “individuals” and “mine”. Responsibility was attributed to someone other than individuals (businesses and/or government) by 10.3% of respondents, and two persons expressed doubts that human activity causes climate change.

3.5 Overall message: “Do something now!”

An open question on Q2 asked “What message are you taking away from the film?” (see Table 5). The need for action was the most frequent theme: the words ‘action’ or ‘act’ made 48 appearances in the responses, while the injunctions ‘do something’, ‘do more’ and ‘do what you can’ appear 25 times. The action category was subdivided into three. Responses where it was clear that the respondent was commenting on what they themselves would do, or about the need for personal responsibility, comprised the largest subgroup. Examples include “I will try even harder to reduce my CO_2 emissions” and “It is your personal duty to do what you can”. A second subgroup consisted of general statements such as “We need to take drastic action”, while the third subgroup contained specific suggestions for action that were not personal, or not clearly so, e.g. “UK must promote wind farms!” and “Don’t fly!” Comments about lobbying politicians and ‘spreading the word’ were also common and were coded as distinct categories. Imperative words were often used, ‘need’ being the fourth most commonly found word, with 37 instances, while ‘must’ appeared 19 times.

Table 5: Most common responses to the open question on Q2, 'What message are you taking away from the film?' (*n*=224)

Code assigned	No. of instances	% of responses[b]
Action!	81	36.2
- personal action/responsibility	36	16.1
- general (“do something”)	30	13.4
- specific but not (necessarily) personal	15	6.7
Urgency	50	22.3
Depressed/doubting what it is possible to achieve	26	11.6
Lobby politicians	20	8.9
Spread the word	19	8.5

[b] These percentages do not sum to 100 as responses could be allocated more than one code and not all responses are included

Another widespread response was a sense of urgency, typical comments being “The time to act is now!” and “Time is *NOT* on our side.” The word ‘now’ was the fifth most commonly used in all responses, appearing 31 times; ‘urgency’ or ‘urgent’ appeared 14 times.

Just over one-tenth of respondents expressed a sense of depression, or doubts that enough could be done to prevent catastrophe, typical comments being “Initial reaction is intense depression and cynicism. The message is that we must *all* do something – and I find it hard to believe enough people will do so to convince governments and industry to make the hard decisions we need” and “It is quite a bleak film.”

4. Results: follow-up questionnaire

As can be seen from Table 1, the socio-demographic characteristics of those who responded to the follow-up questionnaire were very similar to the original sample.

However, they were a slightly more concerned and engaged group: 65.4% (compared to 61.8% of the original sample) had donated money in the last year to an organisation campaigning on climate change, 39.5% (36.1%) had stated on Q1 that they were actively involved in such a group, 81.5% (77.6%) gave concern about climate change as one reason for coming to see the film while for 65.8% (60.9%) it was the main reason, and 84.6% (81.7%) had stated that they were "very concerned" about climate change before seeing the film.

In the analysis that follows, only the 162 'before' and 'after' questionnaires which were matched with a completed follow-up questionnaire are included.

4.1 Do the effects of the film last?

The Friedman test (a nonparametric version of analysis of variance) was used to determine whether there were overall differences between all three questionnaires in respondents' levels of concern, motivation to act, knowledge about what to do, fear, and sense of agency. Where significant differences were found, this justified using the Wilcoxon test to examine the significance of differences between Q3 and Q1 or Q2 separately.

The hypothesis was that any heightened concern about climate change and motivation to act that was felt immediately after the film would not persist. There was indeed a decrease in concern about climate change between Q2 and Q3 ($z = 2.548$, $p = 0.006$)[3], although only 26 respondents (16.0%) chose a different point on the Likert scale. There was no significant difference in concern about climate change between the follow-up and the first questionnaire. The hypothesis that motivation to act would fade was accepted on the strength of a Wilcoxon test ($z = 4.192$, $p < 0.001$)[3], and the increased belief that "I can do something" reported immediately after the film was also reversed ($z = 3.987$, $p < 0.001$). There was no difference in the level of agreement with these statements between Q3 and Q1. By the time of the follow-up, respondents' belief that "It's worth lobbying politicians about climate change" had decreased compared to both the initial level ($z = 3.968$, $p < 0.001$) and the level immediately after seeing the film ($z = 3.610$, $p < 0.001$). A possible explanation for this is that news of the UK MPs' expenses scandal broke between the screening of the film and the completion of Q3. A less significant result was that agreement with the statement "I do as much as I can about climate change", which had fallen immediately after seeing the film, had risen again by the time of the follow-up ($z = 2.057$, $p = 0.040$), although it was still lower than it had been before the film ($z = 2.222$, $p = 0.026$).

4.2 Behavioural changes

Table 6 shows responses to the questions about specific actions that respondents might have done or be doing. There are of course drawbacks to using self-report measures of behaviour (Manfredo and Shelby, 1988), but there was no practicable alternative. On the questionnaire it was stressed that "Not all will necessarily be possible for you, or you may not want to do them", to avoid suggesting an expectation that respondents should be engaged in such behaviours. In each section (awareness raising and lobbying; home energy use; travel; food) a range of behaviours was selected, from those thought likely to be least costly in terms of time, effort or money, to those that would likely be more difficult. The majority of these relate to the 'headline behaviour goals' identified by Defra (2008) for policy and communications to focus on.

[3] One-tailed test

The most common response to the first action(s) in each section was "I have done/am doing this, but not because of seeing the film," and to the harder/more expensive options was "I have not done/am not doing/can't do this". For every action there were some participants who reported "I have done this/am doing it more, because of seeing the film"; they were generally a small proportion of the total, decreasing as the behaviours got harder.

Table 6: Responses to multiple-choice questions about specific behaviours (*n*=160-162) (the most common response to each statement is highlighted in bold)

	Not done/doing	Done/doing more, due to film		Done/doing but not due to film
Awareness raising/lobbying politicians	%	%	No.[c]	%
Trying to raise awareness among people I know	14.2	27.8	(45)	**58.0**
Sent message to politician(s) - last 12 months	**53.7**	12.3	(20)	34.0
Actively involved in campaigning group	**59.6**	4.3	(7)	36.0
Attended rally outside Scottish parliament	**81.4**	7.5	(12)	11.2
Calculated 'carbon footprint' - last 12 months	**65.0**	6.3	(10)	28.8
Home energy use				
Installed low energy light bulbs – most/all lights	5.6	6.2	(10)	**88.3**
Turned down heating/cut time heating on	3.7	9.3	(15)	**87.0**
Washing clothes at 30°C (usually/always)	26.9	10.0	(16)	**63.1**
Drying clothes on rack (usually/always)	6.2	3.1	(5)	**90.7**
Installed more insulation/draught-proofing	**55.9**	2.5	(4)	41.6
Changed to 'green electricity' supplier/tariff	**64.4**	4.4	(7)	31.3
Generating energy through home renewables	**93.2**	1.2	(2)	5.6
Travel				
Cut down/avoid driving	6.8	11.7	(19)	**81.5**
Car sharing/car club (leave blank if never drive)	**66.9**	0.8	(1)	32.2
Planning/taking holidays without flying this year	**42.6**	17.9	(29)	39.5
Decided to reduce/stop holiday flying long-term	**40.6**	21.9	(35)	37.5
Food				
Avoiding buying bottled water	14.2	15.4	(25)	**70.4**
Buying more local produce	12.3	17.9	(29)	**69.8**
Reduced meat consumption/eat vegetarian/vegan	27.8	8.6	(14)	**63.6**
Composting food waste	**49.1**	2.5	(4)	48.4

[c] Number of respondents who attributed behavioural changes to the film

An interesting exception to this pattern is that 29 people (17.9% of respondents) said they were "Planning/taking holiday(s) without flying this year" and 35 people (21.9% of respondents) stated that they had "Decided to reduce/cut out holiday flying long-term" as a result of seeing the film. This was a bigger effect than for almost all other actions, and, given the GHG emissions associated with flying, could result in respondents significantly reducing their carbon footprints if they followed through on their intentions. It is of course easier to state an intention than to actually carry out an action, and some participants may rationalise decisions not to fly as being for environmental reasons when other factors (such as the recession) were also important.

4.3 Correlates of behaviour

In order to explore what factors are related to changes in behaviour as a result of the film, a 'film action' variable was constructed. A score of 1 was given for each action that respondents stated they were doing because of seeing the film, 0 for other answers (or no answer). These scores were added for all actions, and ranged from 0 to 14 out of a possible total of 20 (mean 1.9, SD 2.4). Respondents were divided into three groups: those who scored 0 (65 respondents, 40.1%), participants who had carried out 'some' actions, scoring 1 to 4 (78 respondents, 48.1%), and those who had a 'high' score, from 5 to 14 points (19 people, 11.7%). A 'prior action' variable was also constructed in a similar way, where a score of 1 was assigned to each action respondents said they were taking but not because of seeing the film (mean 10.3, SD 3.6). Respondents were categorised as having a 'low' score (< 6, 11 respondents, 6.8% of the sample), 'medium' (6-14, 132 respondents, 81.5%) or 'high' score (>14, 19 respondents, 11.7%). The gamma statistic *G* was then used to test the relation between respondents' action scores and other ordinally-scaled variables, while Cramér's V was used to measure the degree of correlation between action scores and nominal variables such as gender.

It seemed likely that one significant factor affecting scores for action taken as a result of the film would be the level of action participants were already engaged in, and this proved to be the case. There was a strong negative correlation between the 'prior action' score and the 'film action' score ($G = 0.764$, $p < 0.001$): 89.5% of those who had a high 'prior action' score scored 0 for 'film action' compared to 18.2% of those who had a low 'prior action' score; no-one who had a high 'prior action' score scored highly for actions taken as a result of seeing the film, but 45.5% of those with a low 'prior action' score gained a high 'film action' total.

Women were somewhat more likely to have higher 'film action' scores than men ($V = 0.250$, $p = 0.008$); 15.4% of women had a high score, compared to 7.7% of male respondents, while 55.4% of men scored 0 compared to 30.8% of women. Conversely, men were somewhat more likely to have a high 'prior action' score ($V = 0.243$, $p = 0.010$), with 20.0% of men having a high score compared to 5.5% of women. There was no correlation between action scores and whether respondents could reasonably expect to be alive in 2055 (those aged up to 34) or would be beyond average life expectancy by then. There was also no correlation between 'film action' scores and whether participants had donated money to, or were involved in, an organisation campaigning about climate change. However, there was a correlation between having given a donation or being actively involved in a group and having a high 'prior action' score ($V = 0.207$, $p = 0.032$ and $V = 0.306$, $p = 0.001$ respectively). Although this correlation does not prove causality, it accords with the findings of Olli et al. (2001) that involvement in such groups is a significant predictor of pro-environmental behaviour (and suggests that, having already taken many actions, participants involved in groups did not have the opportunity to take many more after seeing the film).

There was a moderate correlation between 'film action' scores and participants' beliefs about the likelihood of worldwide devastation by 2055 ($G = 0.309$, $p \approx 0.007$) [4]: 18.6% of participants who thought that it was "very likely" or "virtually certain" such devastation could occur had a high score, compared to only 8.3% who rated it as "unlikely", "very unlikely", "extremely unlikely", or "impossible". There was no correlation between 'prior action' scores and such belief. There was also no correlation between action scores and levels of agreement with the statement "I fear humanity will

[4] p values for the G statistic are approximate but conservative, i.e. the results are *at least* as significant as stated

not do enough to prevent catastrophic climate change/global warming" on any of the three questionnaires. Looking at levels of concern about climate change, respondents who reported more concern on Q1 had higher 'prior action' scores (G = 0.549, p ≈ 0.036) and there was also a positive correlation between higher 'film action' scores and level of concern on Q2 ($G = 0.441$, p ≈ 0.024) and Q3 ($G = 0.422$, p ≈ 0.018).

Agreement on Q1 with the statements "I feel motivated to try to do something about climate change/global warming", "I can do something to prevent climate change/global warming getting worse", "I know what I can do to reduce my carbon emissions" and "I do as much as I can" was positively correlated with 'prior action' scores ($G = 0.439$, p ≈ 0.003; $G = 0.291$, p ≈ 0.031; $G = 0.694$, p < 0.001; $G = 0.421$, p ≈ 0.003). It is perhaps not surprising, therefore, that there was no significant correlation between 'film action' scores and agreement immediately after the film with the statements "I can do something to prevent climate change/global warming getting worse" or "I know what I can do to reduce my carbon emissions". However, the higher the level of agreement with the statement "I feel motivated to try to do something about climate change/global warming" on Q2 (immediately after seeing the film), the more likely respondents were to have higher 'film action' scores ($G = 0.369$, p ≈ 0.002): 16.3% of those who strongly agreed had a high score and 52.2% had taken some actions, whereas a majority (59.1%) of those who disagreed, felt neutral, or only slightly agreed, scored 0.

Respondents who felt more confused about what to do to cut their emissions, had less confidence that there was any point in doing so, or who felt the overall message of the film was depressing, did not take significantly less action after seeing the film than others. This may be because levels of knowledge and belief in the efficacy of action were high enough before seeing the film that even though it had a negative effect for some people, the effect was not enough to put them off action.

4.4 Barriers to change

On Q3, respondents were asked in each action section whether they would like (or felt it necessary) to do more, and if so, what, if any, are the main obstacles that prevent them (see Table 7). A large majority of respondents said they would like to take more action.

Table 7: Barriers to action as a percentage of number of respondents who said they would like to do more, in each section (most common responses in bold)

	Raise awareness/lobby	Home energy use	Travel	Food
% respondents who would like to do more	71.6	90.7	76.5	77.2
Barriers				
Cost	12.9	**51.0**	37.1	33.6
Lack of options	12.1	31.3	**46.8**	**42.4**
Lack of information	19.8	23.1	11.3	29.6
Inconvenience/discomfort	19.8	15.0	37.1	22.4
Lack of time	**70.7**	19.7	21.0	17.6
No point at the moment	4.3	2.0	0.8	1.6
Other	13.8	21.8	13.7	12.8

In the home energy section, 19 people specifically mentioned that their options were limited by being a tenant, and others mentioned planning permission/conservation

status issues. Regarding travel, five people mentioned having family abroad as a barrier to reducing emissions, and seven said their work required flying.

5. Discussion

5.1 Concern, fear, motivation, and agency

Clearly *The Age of Stupid* attracted a particular type of viewer, at least during the opening week of the film. Many would seem to belong to Leiserowitz's 'alarmist interpretive community': those who have a high risk-perception concerning climate change and are more likely to have taken personal action and to support government policies to mitigate the problem (Leiserowitz, 2007). In terms of Defra's (2008) environmental segmentation model, viewers appear to be 'positive greens' and 'concerned consumers' (who are most willing and able to act), with some 'sideline supporters'. Climate change is now recognised as an issue of concern by many of the UK public: for example, 57% of respondents in a Scottish survey agreed with the statement "Climate change is an immediate and urgent problem" (Scottish Government, 2008). However, participants in my study exhibited particularly high levels of concern about climate change, and, unlike participants in other studies (Defra, 2007, 2009; Lorenzoni and Pidgeon, 2006; Lowe et al., 2006; Norton and Leaman, 2004), expressed more concern about climate change than about other issues.

In this they were unlike UK audiences who saw *The Day After Tomorrow*. Lowe et al. (2006) found that only 5% of their sample went to see that film because they were interested in climate change or environmental films, and their respondents expressed higher levels of concern about terrorism and AIDS than about climate change before seeing the film. Balmford et al. (2004) assessed levels of concern by asking viewers to state how they would allocate £1000 to five different 'good causes', and found that, before respondents had seen the film, climate change was the least popular cause out of 'health', 'animal welfare', 'UK social', 'climate change' and 'international aid' (personal communication, 2010). Even in Germany, where Reusswig et al. (2004) found that the most common reason for seeing *The Day After Tomorrow* was "I'm interested in the climate issue", the proportion of respondents who gave this reason was only 35.9% – less than half the proportion of viewers who came to see *The Age of Stupid* because of concern about climate change – and almost matched by the proportion who said "I like disaster movies" (34.5%). Unlike *The Day After Tomorrow*, *The Age of Stupid* appears to have been largely 'preaching to the converted'.

The relative success of *The Day After Tomorrow* in reaching an audience not already especially concerned about climate change may suggest that climate change communications would benefit from being packaged in a more populist format, or within a fictional frame. However, the fictional element of *The Age of Stupid* – the portrayal of devastation in 2055, accompanied by comments from Postlethwaite's character such as "It's like looking through binoculars observing people on a far-off beach, running around in circles, fixated on the small area of sand under their feet as a tsunami races towards the shore" (which may give a misleading impression of the speed at which changes could take place) – has been criticised by some commentators. Wehner (undated) argues that "Given how central the catastrophic failure of society is to the film's message, this alarmist film is more likely to fuel the arguments of climate change skeptics rather than foster informed and productive discussions of this extremely important issue." Alternatively, another reviewer, climatologist Stephen Schneider, says: "Although one needn't take the detailed future scenes literally as mainstream projections, please do take seriously the message that our greed and neglect is no gift to

our children and grandchildren …" (Schneider, undated). Although *The Age of Stupid* filmmakers believe that climate science does not contradict their film (on the website, Lynas (2009) defends the portrayal of devastating impacts), the film raises important questions about the tradeoffs between presenting complex scientific information and engaging/motivating people using vivid imagery, and about whether it is desirable, or justifiable, to present extreme scenarios in climate change communications in order to try to convince the audience of the urgency of the issue. Lowe et al. (2006) suggest that the portrayal of extreme, unlikely impacts leads to disbelief and denial about climate change – three of the studies on *The Day After Tomorrow* found a decrease in the perceived likelihood of climate change among viewers (Lowe, 2006). Viewers of *The Age of Stupid* who accepted as likely the devastation portrayed seem to have been inspired to take more action after seeing the film than those who thought such a scenario unlikely (see section 4.3). However, some critics may still be uneasy at what they see as sowing of misinformation.

It is interesting that so many engaged and highly educated respondents in this study believe that world devastation on the scale depicted by *The Age of Stupid* could happen by 2055. Although the impacts of worst-case emissions scenarios are predicted to be severe, devastation of such magnitude is not likely within this time frame (Betts, undated; Parry et al., 2007). Respondents' perceptions might be a reflection of the climate change discourses that are prevalent in the media, highlighting potential disasters and the threat of passing a 'tipping point' (Boykoff, 2008; Russill and Nyssa, 2009). Indeed, the recent rise in coverage of climate change in the UK quality press has mostly been of 'potential catastrophe' and other crisis discourses (Doulton and Brown, 2009). Some of the organisations that many respondents have donated money to or are actively involved in also employ disaster narratives and imagery to appeal to the public. For example, a current (October 2009) Christian Aid poster reads "Our actions are destroying more than just icebergs. Climate change could push 250 million sub-Saharan Africans into poverty by 2020." Thus the narrative strand of the film is congruent with messages that participants may be receiving from trusted others.

Despite anxiety that the use of shocking images and disaster narratives reduces efficacy to act because people feel overwhelmed and have a reduced sense of agency (Lowe, 2006; Moser, 2006; Moser and Dilling, 2004; Nicholson-Cole, 2005), this largely does not appear to have happened in this case. The film did not seem to increase viewers' fears that humanity will not do enough to prevent catastrophic climate change. Respondents emerged from the film with increased motivation to take action, and an increased belief that they could do something to prevent climate change getting worse, along with a sense that they are not already doing everything they can. Those who had expressed higher levels of concern or belief in the likelihood of devastation on Q2 did then apparently take more actions as a result of seeing the film. This can perhaps be explained by the fact that most respondents felt that they knew what to do to reduce their emissions before seeing the film, so they were not left facing images of devastation without having much idea whether or how they could prevent it. It might also be because a significant proportion of viewers were involved in, or had some contact with, organisations that campaign about climate change, providing them with not only information about what to do, but moral support and encouragement (Howell, 2008; Moser, 2006). The relatively high level of action that respondents were already engaged in before seeing the film may have helped them take more action afterwards because of the enabling 'tacit knowledge' that their previous actions would have developed (Darby, 2006a).

5.2 Responsibility

For a significant proportion of viewers, the main message they were taking away from the film was the need to take (more) personal action themselves, both to reduce emissions and to lobby politicians and 'spread the word' about the need for action. In comparison, in surveys of environmental attitudes and behaviours with representative samples of the general population, 28% of respondents in England and 35% of respondents of Scotland agreed with the statement "I don't believe my everyday behaviour and lifestyle contribute to climate change" (Defra, 2009; Scottish Government, 2008), suggesting that the general public would be less likely to accept personal responsibility for reducing emissions.

It is notable that 12.5% of respondents suggested that the government must take the lead on emissions reductions, although everyone is responsible. This attitude is commonly found in other studies (e.g. Lorenzoni et al., 2007; Nicholson-Cole, 2005). High levels of support exist for many aspects of state intervention for the common good (Halpern and Bates, 2004), while the main barriers respondents reported to taking action to reduce emissions were cost and lack of options – factors perceived to be beyond the control of individuals, requiring government intervention. Given the already low levels of trust in politicians, and engagement with political processes, the marked decline on Q3 in agreement that it is worth lobbying politicians is concerning.

One in 10 filmgoers in this study attributed responsibility solely to governments and/or businesses. This compares with 24% of respondents who placed responsibility with governments/world leaders after seeing *The Day After Tomorrow* (Lowe et al., 2006). The difference may reflect both the different audience for the two films and changes in public knowledge and perceptions since that film was released in 2004.

5.3 Action

An evaluation of the efficacy of the film in promoting action and behavioural changes would seem to depend on whether one has a 'glass half empty' or a 'glass half full' perspective. On the one hand, for every action/behaviour asked about on Q3, a large majority of participants stated either that they were already doing it, or that they had not done it/were not doing it. The kind of people who came to see the film were already engaged in lower-cost actions, and the film did not result in many of them beginning to engage with the more costly behaviours, at least in the 10-14 weeks following the film. Arguably, since concern and motivation to act had dropped back to their initial levels by this time, most respondents who had not begun to take action because of the film would not later do so (although the film could be part of a 'drip drip' effect of repeated messages that might later make action due to another stimulus more likely). The proportion of respondents who attributed action to having seen the film was rarely above 10%, and generally rather lower than this.

On the other hand, it could be argued that results such as 11.7% of respondents cutting down on driving and 8.6% reducing their meat consumption represent considerable success: this could mean not only notable reductions in the carbon footprints of those individuals, but also contribute to changing social norms, which are an important influence on behaviour (Bamberg and Schmidt, 2003; Lucas et al., 2008; Prendergrast et al., 2008).

The responses about flying are particularly interesting, since reducing flights would likely make a big difference to an individual's carbon footprint. Choosing not to fly was modelled in the film by a couple who travelled from the UK to France by train, and four people commented without prompting about the need to reduce/stop flying

when asked on Q2 about the overall message they were taking from the film. A study of individuals involved in Carbon Rationing Action Groups (groups of concerned citizens who set themselves a voluntary carbon 'ration' each year), found that most had reduced or cut out flying altogether once they realised the difference it would make (Howell, 2008). Any suggestion of measures to reduce flying meets strong opposition: for example, David Cameron's proposal for a tax on flights was branded a 'tax on fun' (Kite et al., 2007); yet once the potentially difficult decision not to fly has been taken it is a low- or no-cost action in terms of money and effort (unless a long-distance overland journey is taken instead).

One interesting finding was that a larger proportion of men than women had high scores for action taken before the film. This would appear to run counter to studies which find that women express more willingness to adopt pro-environmental behaviours than men (Kollmuss and Agyeman, 2002; O'Connor et al., 1999). However, it may just indicate that the men who attended the film were particularly unrepresentative of men in general. The relationship is also complex, in that there were also a higher proportion of men than women who had *low* 'prior behaviour' scores, and proportionally more women than men who had medium scores.

This survey was not able to explore barriers to action in detail but it gives an overview of some of the issues. An interesting result is that "lack of information" is cited as the second or third most important barrier in each section except travel. One could argue, therefore, that the 'information deficit' model of (lack of) behaviour change is vindicated to a certain extent, so the government has been right to run campaigns aimed at providing more information in the hope of altering behaviour. However, it might be that people use 'lack of information' as an excuse for inaction. Alternatively, there may be sufficient information but the public has difficulty in accessing it or in using it in such a way as to take action.

A related issue is the limits of media such as films (or other one-off presentations of information) to influence behaviour. Research about advertising suggests that people need to see messages more than once in order to remember and respond to them (Vakratsas and Ambler, 1999; Zielske, 1959), although the effects of a film which is deliberately watched may be different from those of a brief advertisement. Perhaps more importantly, reading a leaflet, viewing a television advertisement, or watching a film impact on individual cognition (although the effect of experiencing the film as part of an audience, rather than alone, would be interesting to research), but then routine practices and social context come into play. A wide range of factors, such as social norms and conventions (Cialdini et al., 1990; Heiskanen et al., 2009), habits (Bamberg and Schmidt, 2003; Heimlich and Ardoin, 2008), and the kind of barriers explored in this study, mediate the effects of communications and resulting attitudes on actual behaviour. Probably as a result, this study, in common with others (Heath and Gifford, 2002; Lindenberg and Steg, 2007; Whitmarsh, 2009b), found that where there is some evidence of a link between attitudes and pro-environmental behaviour, it tends to be less costly behaviour in terms of time, money, or effort.

A single film is likely to have only a small effect overall (and a study like this cannot disaggregate all possible other influences on participants' behaviour); the influence it may have needs to be supported by other interventions. Habit is such an important factor that it is useful to encourage people to make public commitments and 'implementation intentions' regarding action (Bamberg, 2000; Gollwitzer and Brandstäter, 1997; Heimlich and Ardoin, 2008), and to provide prompts (McKenzie-Mohr, 2008) and feedback. The latter might be merely descriptive feedback, e.g. about levels of energy use (Darby, 2006b) or might also include injunctive messages about how well the recipient is doing (Ayers et al., 2009; Schultz et al., 2007). Being part of a

community group/network is also an important influence on behaviour (Middlemiss, 2008; Olli et al., 2001). The filmmakers did try to address this to some extent by encouraging campaign groups to be present at screenings in order to let viewers know what local action they could get involved with. Future work will examine the rate of viewer sign-ups to such groups and the 10:10 campaign, and whether involvement in these persists and correlates with behavioural changes.

6. Conclusions

The Age of Stupid attempts to convince viewers to take action to mitigate climate change using an appeal based on the need to avoid disaster. Among the viewers that this study surveyed, it does seem to have had some success in raising levels of concern and motivation to act immediately after seeing the film. Furthermore, 60% of respondents to the follow-up questionnaire attributed at least one action they are taking (or doing more of), either to raise awareness about climate change and lobby politicians, or to reduce their carbon footprint, to the effect of having seen the film. However, heightened levels of concern and motivation were no longer in evidence at the time of the follow-up survey, 10-14 weeks after the release of the film, and the actions or behavioural changes that respondents were most often engaged in are those that require less effort, money or time.

The filmgoers surveyed were a very particular group, not representative of the general public. They exhibited very high levels of concern about climate change and motivation to act to mitigate it, even before seeing the film. A significant proportion were actively involved in, or had given a donation to, groups campaigning wholly or partly about climate change. Therefore it is not possible to assume that these findings would be true of an audience more similar to the general population.

Arguably, the film may have been successful in motivating these viewers to take more action because (a) it offers information that is already accepted by this group; (b) the 'disaster narrative' element of the film may be familiar and therefore less overwhelming than it would otherwise have been; (c) these viewers largely accept personal responsibility for reducing GHG emissions; (d) they already knew how to take action; and (e) a significant proportion have the support and encouragement that comes from being associated with or actively involved in a group campaigning on these issues. The question remains whether the film, or other climate change communications framed in a similar way, would achieve the same response from members of the general public for whom these statements are not true. Research by Stoll-Kleemann et al. (2001) on the psychology of denial concerning climate change mitigation suggests that if people do not believe that their actions will make a difference, unlike most of the filmgoers in this study, they are less likely to take action. Also, one of the two characters in the film who was trying to mitigate climate change, personally as well as through his work, was a windfarm developer. Since windfarms are controversial in the UK (Devine-Wright, 2005; Warren and Birnie, 2009), he did not represent a positive role model for certain viewers to identify with. Future communications may need to focus more on presenting positive stories of how 'ordinary people' (not 'environmentalists') have taken action for a variety of reasons, thus promoting and utilising the power of constructive social norms.

Given that lack of information was cited by respondents as one of the main barriers preventing further action in various areas, it seems likely that viewers who start from a position of knowing less about possible actions would find it harder to achieve behavioural changes. Leo Murray, one of the film-makers, recognises that "The film frightens people but doesn't give much of a steer about what to do" (personal

communication, 2009). The film has also been criticised for offering only a vision of what we want to avoid, rather than images of a positive future we want to achieve (Brant, 2009). Hence the launch of the 10:10 campaign, which aims to provide a positive, aspirational message about what to do, that will appeal to people who do not self-identify as 'activists' or 'environmentalists' (Leo Murray, personal communication, 2009). Climate change campaigners and policymakers should bear in mind that, as 'the public' is heterogeneous as regards not only knowledge but also values, climate change risk perceptions, etc. (Leiserowitz, 2006; Michaelis, 2007), it is likely that a variety of messages will be needed to appeal to a wide audience. There is also work to be done at the policy level to remove barriers such as cost and lack of options that were reported as preventing further action even by this sample of motivated individuals.

This study contributes to research on the effectiveness of visually-based and emotionally-engaging climate change communications in changing attitudes and behaviour. In common with other studies (Leiserowitz, 2004; Lowe et al., 2006; O'Neill and Hulme, 2009), this research found evidence of increased concern as a result of the 'intervention' under examination, although there is an issue about the persistence of this effect. I also explored participants' sense of agency, which has been less extensively researched than concern about climate change, despite being an important factor in pro-environmental behaviour (though see Nicholson-Cole, 2005 for evidence about visualisations of climate change compared to self-efficacy). Concerns that viewers might be overwhelmed by the shocking images and feel less convinced that it is possible or worthwhile for them to take action do not seem to be supported by my evidence, but given the characteristics of the audience, climate change communicators should be wary of assuming this refutes other findings on the problems of fear appeals (Moser, 2007 provides a useful overview). This study extends previous research by examining whether the observed increased concern and motivation to act did actually translate into behavioural changes, and found mixed results. Follow-up research will investigate whether respondents maintain behavioural changes that they have made, and whether they act on their stated intentions regarding flying.

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